

CLAIMS

1. A filtration system for filtering water comprising at least one chamber, said chamber comprising

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- a. a water inlet defining a proximal end of the chamber;
- b. a water outlet defining a distal end of the chamber;
- c. means for water distribution within the chamber;
- d. filtration medium for filtering water passing through the chamber;
- 10 e. at least one braker grid for preventing water channeling within the chamber,

wherein said braker grid is positioned substantially distally to said means for water distribution.

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2. The filtration system according to claim 1, wherein by altering the water level within said chamber from a level substantially distal to said at least one braker grid in a substantially proximal direction, said filtration medium is forced through the braker grid, and wherein by lowering the water level within said chamber, said filtration medium is forced through said at least one braker grid.

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3. The filtration system according to claim 1, wherein said filtration medium is comprised of particles which are buoyant in water.

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4. The filtration system according to claim 3, wherein said particles are comprised of substantially spherical microbeads.

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5. The filtration system according to any of the preceding claims, wherein said braker grid is comprised of a substantially rigid structure, said structure comprising means for impeded movement of said filtration medium through the structure.

6. The filtration system according to claim 5, wherein said braker grid comprises a collection of openings for allowing impeded passage of said filtration medium through the braker grid.

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7. The filtration system according to claims 6, wherein said braker grid comprises a perforated plate comprising a collection of substantially spherical holes.

8. The filtration system according to claim 6, wherein said braker grid is comprised of a grid comprising substantially rigid elongated rods.

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9. The filtration system according to any of the claims 6-8, wherein said openings have an average width in the range of about 1-100 mm, such as in the range of about 2-50 mm,

such as in the range of about 3-30 mm, such as in the range of about 2-20 mm, such as in the range of about 5-10 mm.

10. The filtration system according to any of the preceding claims, wherein said means for
5 water distribution comprise a perforated plate, said plate being positioned proximally to said braker grid.

11. The filtration system according to claim 10, wherein said perforated plate is attached
10 to said chamber such that the flow of water distributed within said chamber is limited to the flow of water through said perforated plate.

12. The filtration system according to any of the claims 1-9, wherein said means for water distribution comprise a plurality of nozzles.

13. The filtration system according to any of the preceding claims, wherein hydraulic
15 loading is in the range of about 5 – 100 l/s•m², such as about 10 – 70 l/s•m², such as about 15 – 50 l/s•m², such as about 23 – 33 l/s•m².

14. The filtration system according to any of the preceding claims, wherein the hydraulic
20 loading area is in the range of about 0.5-10 m², such as 1-8 m², such as 2-6 m².

15. The filtration system according to any of the preceding claims, wherein said filtration system contains at least two chambers, and wherein

25 • fluid flow into a first chamber is greater than fluid flow from said first chamber until the fluid level in said chamber has reached a predetermined upper limit;
• fluid flow from a second chamber is greater than fluid flow into said second chamber until the fluid level in said chamber has reached a predetermined lower limit;

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• fluid flow into and from said first and said second chamber is adjusted so as to achieve a decrease in fluid level in a chamber having reached its upper fluid level and an increase in fluid level in a chamber having reached its lower fluid level;
and wherein

35 • fluid flow into and from additional chambers is alternately greater to and from said additional chambers, such that fluid flow into said filtration system is substantially equal to fluid flow from said filtration system.

16. A method of purifying water, comprising providing water from an aquaculture to a
40 filtration system, said system comprising at least one chamber comprising

a. a water inlet defining a proximal end of the chamber;

- b. a water outlet defining a distal end of the chamber;
- c. means for water distribution within the chamber;
- d. filtration medium for filtering water passing through the chamber;
- e. at least one braker grid for preventing water channeling within the chamber,

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wherein said braker grid is positioned substantially distally to said means for water distribution,
and wherein said at least one braker grid comprises means for allowing passage of said filtration medium through the braker grid, and wherein substantially purified water is
10 collected from said at least one chamber outlets.

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17. The method according to claim 16, wherein by altering the water level within said chamber from a level substantially distal to said at least one braker grid in a substantially proximal direction, said filtration medium is forced through the braker grid, and wherein by
lowering the water level within said chamber, said filtration medium is forced through said
at least one braker grid.

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18. A water recirculation system for use in fish production comprising:

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- a. at least one aquaculture tank;
- b. means for supplying water from said at least one tank to a filtration system;
- c. a filtration system as defined by any of claims 1-15;
- d. means for supplying water from said filtration system to said at least one aquaculture tank.

19. The water recirculation system according to claim 18, further comprising means for aeration of water, said means being located distally to said filtration system and proximally to said fish raising tank.

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20. The water recirculation system according to claims 18 or 19, further comprising means for filtering solid particles from water, said means being located distally to said fish raising tank and proximally to said filtration system.